Patent claims

1. A method for visually supporting an electrophysiology catheter application in the heart, whereby electroanatomical 3D mapping data, provided during the performance of the catheter application, of an area of the heart to be treated are visualized, 3D image data of the area to be treated are recorded with a method of tomographical 3D imaging before the catheter application is carried out, a 3D surface profile of objects in the area to be treated is extracted from the 3D image data by segmentation, and the electroanatomical 3D mapping data and 3D image data representing at least the 3D surface profile are visualized by registration correctly correlated in position and dimension and superimposed upon one another, wherein the correlation in the correct position and dimension is automatically effected by the surface matching, at least in one stage of the registration, in that the 3D surface profile from the 3D image data is at least approximately brought to match a 3D surface profile from the 3D mapping data.

2. The method as claimed in claim 1, wherein the 3D image data of the area to be treated are recorded with a method of X-ray computer tomography or of magnetic resonance tomography.

3. The method as claimed in claim 1, wherein the 3D image data of the area to be treated are recorded by means of a 3D ultrasonic method.

4. The method as claimed in one of claims 1 to 3, wherein the correlation with the correct position and dimension is effected automatically in a first stage during the performance of the catheter application by means of distinct anatomical points or artificial markers and is refined by the surface matching in a later second stage.

5. The method as claimed in one of claims 1 to 4, wherein the 3D image data are visualized via a volume rendering technique.

6. The method as claimed in one of claims 1 to 4, wherein the 3D surface profile from the 3D image data is visualized as polygonal grid.

7. The method as claimed in one of claims 1 to 6, wherein the superimposition is effected with adjustable transparency and adjustable blending factor.

8. The method as claimed in one of claims 1 to 7, wherein a registration is effected between a catheter used during the catheter application and the 3D image data and at least a part of the catheter is visualized in real time in the representation of the 3D image data representing at least the 3D surface profile.

9. The method as claimed in claim 8, wherein the at least one part of the catheter is visualized without superimposition of the 3D mapping data from time to time.

10. The method as claimed in claim 8 or 9, wherein in each case an instantaneous distance of a tip of the catheter from a predeterminable picture element of the 3D image data is calculated and the distance is represented coded in the visualization.

11. The method as claimed in claim 10, wherein the distance is represented by color coding of the visualization of the catheter.

12. A device for carrying out the method as claimed in one of the preceding claims, comprising

- one or more input interfaces (14, 15) for electro-anatomical 3D mapping data and 3D image data,
- a segmentation module (11) which is constructed for segmenting the 3D image data in order to extract a 3D surface profile of objects contained within a volume recorded by means of the 3D image data,
- a registration module (12) connected to the segmentation module (11), which is constructed for an automatic correlation with the correct position and dimension of the electroanatomical 3D mapping data and the 3D image data representing the 3D surface profile, by surface matching of the 3D surface profile from the 3D image data to a 3D surface profile from the 3D mapping data in at least one stage of the registration, and
- a visualization module (13) connected to the registration module (12), which superimposes the 3D mapping data and at least the 3D image data representing the 3D surface profile on one another in the correct position with the correct dimension and provides these for visualization by means of a display device (6).

13. The device as claimed in claim 12, wherein the registration module (12) is constructed for the automatic correlation in the correct position with the correct dimension in a multi-stage process, wherein the correlation in the correct position and the correct dimension is effected by means of distinct anatomatical points or artificial markers in a first stage and is refined by the surface matching of the 3D surfaced profile from the 3D image data to a 3D surface profile from the 3D mapping data in a later, second stage.

14. The device as claimed in claim 12 or 13, wherein the visualization module (13) is constructed for visualizing a part of a catheter used within a representation of the 3D image data, forming at least the 3D surface profile, in real time.

15. The device as claimed in claim 14, wherein a calculation module (16) is provided which calculates an instantaneous distance of a catheter tip from a predeterminable picture element of the 3D image data, and the visualization module (13) is constructed for the coded representation of the calculated distance in real time.

16. The device as claimed in claim 15, wherein the visualization module (13) is constructed for colored visualization of the part of the catheter, the color varying in dependence on the distance calculated.